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N207 N211 N224 N226 N238 N2704 N2736 N3112  
N3300 N361 N362 N389 N46X N478 N501 N502 N552  
N564 N569 N57X N58X N58Y N625 N661 N670 N671  
N708 N709 N757 N758 N76X

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GB 2257929 A GB 2252079 A GB 2207089 A

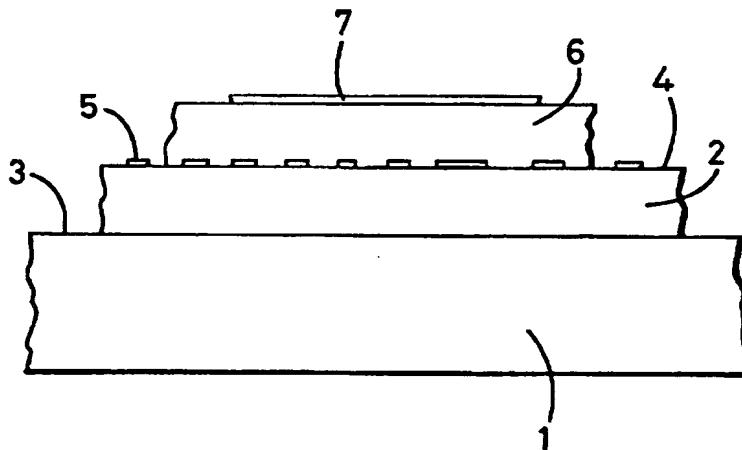
(58) Field of Search

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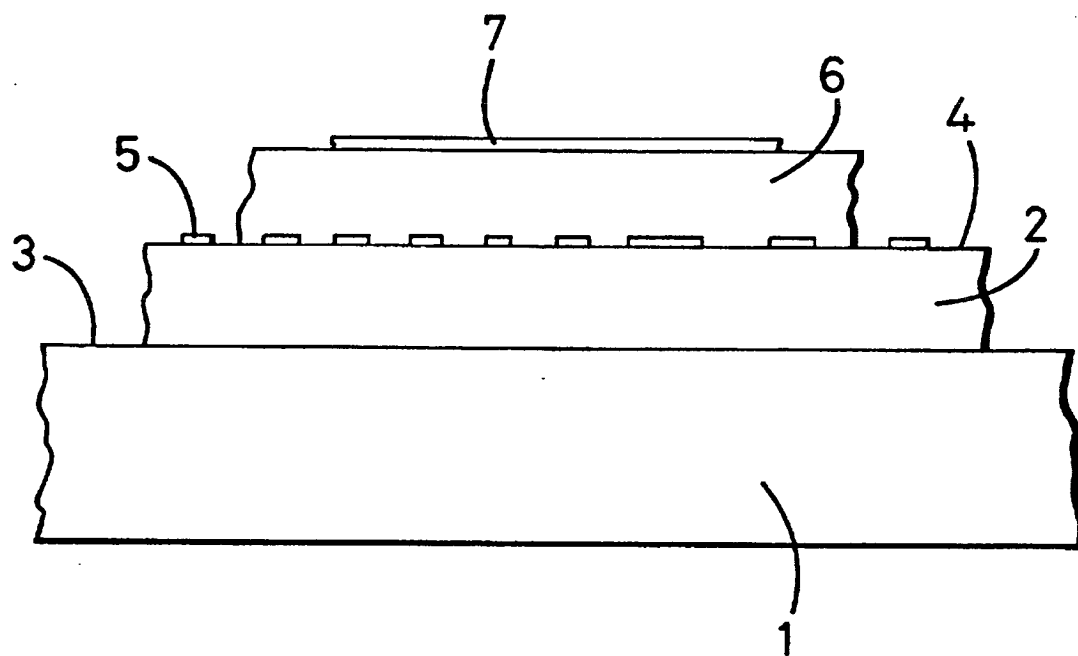
(54) Abstract Title

Panels

(57) A panel having a glass substrate 1, carries a transparent polyester powder-coating 2 with images 5 printed on its back surface 4 for viewing through the glass. A coloured polyester powder-coating 6 covers printed surface 4 and may be backed by metal foil 7. Manufacture involves heating polyester powder deposited on a silane-treated surface 3 of the glass 1, to form the coating 2 about 70% cured. Images 5 are printed on surface 4 using a colour-separation process with ink having u.v. - and thermo-curing properties, the ink being u.v. cured after each printing step of the process. Heat applied to cure polyester powder of coating 6, also thermo-cures the ink 5 and completes curing of coating 2. The foil 7 is brought into contact with the melted powder of coating 6 to bond it to the coating 6.



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### Panels

5 This invention relates to panels and is concerned especially with panels of a decorative or other form incorporating one or more viewable images.

10 It is known from GB-A-2207089 and GB-A-2252079 to provide architectural and other panels that present a coloured background viewable through a glass or other transparent or translucent surface. The present invention has as one of its objects the extension of this to enable one or more images to be similarly presented.

15 According to one aspect of the present invention there is provided a panel having a transparent or translucent facing that carries on its back surface a transparent fused coating of thermosetting material, wherein one or more printed images are borne by the back surface of the transparent coating and the one or more images on this surface are covered by a further fused coating of thermosetting material.

20 The transparent and further coatings may both be of fused polyester or other powder-coating material, and the further coating may contain pigmentation.

25 According to another aspect of the invention there is provided a method of manufacturing a panel, wherein a thermosetting powder-coating material which is deposited on the back surface of a transparent or translucent facing of the panel, is heated to form a partly-cured transparent coating on said back surface, one or more  
30 images are printed on the back surface of the partly-cured transparent coating, further thermosetting powder  
35 material is deposited to cover the one or more printed

images, and heat is applied both to complete curing of the transparent coating and fuse the further powder material into a coating bonded to the transparent coating.

5

The partly-cured transparent coating may be a transparent coating of thermosetting powder material cured to substantially 70% of its fully-cured condition.

10

The further thermosetting powder material may be a thermosetting powder-coating material and the heat applied to fuse the further powder material may cure this powder concurrently with completing cure of the transparent coating.

15

The one or more images may be printed in an ink having both ultra-violet and thermo-curing properties. In this case, ultra-violet light may be applied to harden the one or more printed images prior to the deposition of the further thermosetting powder material thereon. More especially, a colour-separation printing process may be used with ultra-violet light applied following each step of the process to harden the ink applied during that step.

20

A panel and a method of manufacture thereof, both in accordance with the present invention will now be described, by way of example, with reference to the accompanying drawing which shows the panel in sectional side elevation.

25

Referring to the drawing, the panel is faced by a sheet 1 of clear glass which carries a polyester coating 2 that is bonded to a back surface 3 of the glass using a silane  
35      adhesion promoter. The back surface 4 of the coating 2 is printed with one or more images in ink 5 and the whole of the printed surface 4 is covered by a further

polyester coating 6 of white or other colour. The coating 6, which provides the background against which the one or more printed images on the surface 4 can be viewed through the glass, is backed by an aluminium (or  
5 other metal) foil 7.

In the manufacture of the panel shown in the drawing, the surface 3 of the glass sheet 1 is cleaned and coated with a film (not shown) of the silane adhesion promoter.  
10 Polyester powder-coating material is then deposited on the silane-prepared surface 3 and subjected to heat to melt it and bring it to a substantially hard, but not to the fully cross-linked final form of the coating 2, leaving it about 70% cured. One or more images in the  
15 ink 5 are now printed on the back surface 4 of the coating 2 in its partly-cured state, using a silk-screen, bubble-jet or laser printing technique.

The printing may be half-tone or line print, and where colour is involved is applied as a colour-separated print image. The ink used is a hybrid to the extent that it has ultra-violet and thermo curing properties. The ultra-violet curing property is used between successive steps in the colour-separation process to harden the ink  
20 after each ink application to the extent that the print is touchable without smudging and will not run, but is still soft; desirably the ink contains a reactive agent that gives it a high cure-rate to ultra-violet light. The print is applied in the reverse order from  
25 convention, since the image is to be viewed through the glass sheet 1 and clear coating 2.  
30

Following application of the print image(s), polyester powder-coating material containing appropriate pigments  
35 to give the white or other colour for the background to the printed image(s), is deposited on the printed surface 4. Heat is now applied to cure the powder into the

hardened coating 6 and concurrently complete the cure of the coating 2 and of the ink 5. The thermo-cure agent of the ink ensures that the print fuses into the coatings 2 and 6 as they harden fully into one. While during the heating, the powder of the coating 6 is in the melt form, the aluminium foil 7 is brought into contact with the melt to be bonded firmly to the coating 6 in the fully hardened and finished panel.

10 The coatings 2 and 6 of polyester are found to be subject to moisture ingress if they exceed 80 microns in thickness. Where they are 80 microns or less in thickness their dissimilar characteristics, even though they are of the same basic material, acts as a moisture barrier resisting ingress of moisture through capillary action.

20 The aluminium foil 7 acts as a moisture barrier, but even if it is omitted, the molecular nature of the polyester inks are sufficiently different to provide an effective interference barrier between the two polyester powder coatings 2 and 6, enhancing the water-resisting characteristics.

**Claims:**

1. A panel having a transparent or translucent facing that carries on its back surface a transparent fused coating of thermosetting material, wherein one or more printed images are borne by the back surface of the transparent coating and the one or more images on this surface are covered by a further fused coating of thermosetting material.
2. A panel according to Claim 1 wherein the transparent and further coatings are both of fused powder-coating material.
3. A panel according to Claim 2 wherein the transparent and further coatings are both of polyester powder-coating material.
4. A panel according to any one of Claims 1 to 3 wherein the further coating contains pigmentation.
5. A panel according to any one of Claims 1 to 4 wherein said further coating is backed by metal foil.
6. A panel according to any one of Claims 1 to 5 wherein the facing is of glass.
7. A method of manufacturing a panel, wherein a thermosetting powder-coating material which is deposited on the back surface of a transparent or translucent facing of the panel, is heated to form a partly-cured transparent coating on said back surface, one or more images are printed on the back surface of the partly-cured transparent coating, further thermosetting powder material is deposited to cover the one or more printed images, and heat is applied both to complete curing of

the transparent coating and fuse the further powder material into a coating bonded to the transparent coating.

8. A method according to Claim 7 wherein said partly-cured transparent coating is a transparent coating of thermosetting powder material cured to substantially 70% of its fully-cured condition.

9. A method according to Claim 7 or Claim 8 wherein the further thermosetting powder material is a thermosetting powder-coating material and the heat applied to fuse the further powder material cures this powder concurrently with completing cure of the transparent coating.

10. A method according to any one of Claims 7 to 9 wherein the further thermosetting powder material includes pigmentation.

11. A method according to any one of Claims 7 to 10 wherein said one or more images are printed in an ink having both ultra-violet and thermo-curing properties, and ultra-violet light is applied to harden the one or more printed images prior to the deposition of the further thermosetting powder material thereon.

12. A method according to Claim 11 wherein the one or more printed images are applied through successive steps of a colour-separation printing process, and the ultra-violet light is applied following each step of the process to harden the ink applied during that step.

13. A method according to any one of Claims 7 to 12 wherein a metal foil is brought into contact with the back surface of the further thermosetting powder while that powder is in a melt form such that the foil is bonded to the resultant fused coating.



14. A method according to any one of Claims 7 to 13 wherein the facing is of glass.

15. A panel substantially as hereinbefore described with reference to the accompanying drawing.

16. A method of manufacturing a panel according to any one of Claims 1 to 6 or according to Claim 15, wherein the method is substantially as hereinbefore described with reference to the accompanying drawing.



Application No: GB 9923905.5  
Claims searched: 1-16

Examiner: Richard Kennell  
Date of search: 3 February 2000

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.R): B2E (EFD, EN, EQ, EM)

Int CI (Ed.7): -

Other: Online: WPI, EPODOC, JAPIO

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2257929 A (TUDOR-HART), whole document	1-6 at least
Y	GB 2252079 A (CHELSEA ARTISANS), whole document	1-6 at least
Y	GB 2207089 A (CHELSEA ARTISANS), whole document	1-6 at least

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
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A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.